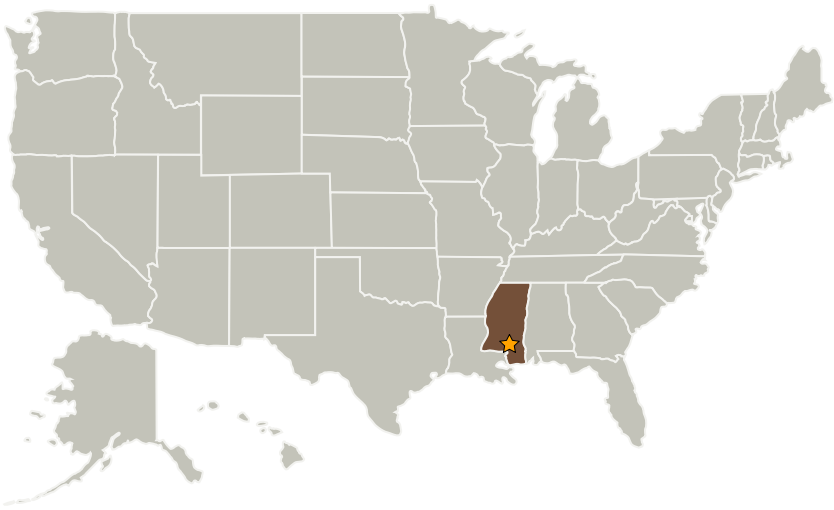
Hydrocarbon Rocket Engine Plume Imaging with Laser Induced Incandescence, Phase I

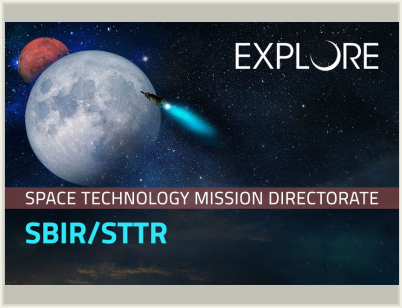
Completed Technology Project (2007 - 2007)

Project Introduction

NASA/ Marshall Space Flight Center (MSFC) needs sensors that can be operated on rocket engine plume environments to improve NASA/SSC rocket engine performance. In particular, NASA/MSFC would like to develop sensors to monitor the performance of rocket engines. The measurement of soot volume fraction and soot particle size can be employed to develop a sensor for on-line, real-time measurements to characterize the performance of hydrocarbon rocket engines and study the effects of the rocket engine exhaust on the environment. The goal of this proposed effort is to develop a laser-induced incandescence (LII) sensor, which is able to provide near real time measurement of soot concentration in the engine plume. During Phase I, a LII system based on telescopic collection optics for remote applications will be designed. The experimental parameters will be evaluated to achieve optimum response time and sensitivity. The study from Phase I will provide the necessary information to improve the phase II prototype design to achieve millisecond response time and better sensitivity. In Phase II, a prototype fieldable LII system will be developed and tested at MSFC and will be delivered to NASA/MSFC for further testing.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Stennis Space Center(SSC)	Lead Organization	NASA Center	Stennis Space Center, Mississippi
Cook's Advanced Energy Conversion, LLC	Supporting Organization	Industry	Starkville, Mississippi

Primary U.S. Work Locations
Mississippi

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jagdish Singh

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.5 Propulsion Flowpath and Interactions